SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc.(Statistics) END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - III

20USTCT3005 - Distribution Theory-II

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Derive the mean and variance of Exponential distribution.
2. State and prove the additive property of Cauchy distribution.
3. Show that the first two moments of standard Weibul distribution are $\Gamma\left(\frac{1}{c}+1\right)$ and $\Gamma\left(\frac{2}{c}+1\right)$
4. If X is a chi-square variate with n degrees of freedom, then prove that for large n, $\sqrt{2X} \sim (\sqrt{2n}, 1)$
5. For the 2 × 2 contingency table

a	b
c	d

Prove that chi-square test of independence gives
$\chi^2 = \frac{N(ad-bc)^2}{((a+c)(b+d)(a+b)(c+d))}$,Where N $= a + b + c + d$
6. List at least three applications of t-distribution and also list the assumptions for Student's t-test.
7. Show that in $F(n_1, n_2)$ distribution, if we let $n_2 \to \infty$, then $\chi^2 = n_1 F$ follows χ^2 distribution with n_1 degrees of freedom.
8. Derive the pdf of the n^{th} order statistics.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Derive the moment generating function of the random variable X which follows the beta distribution.
10. Show that the odd moments of Logistic distribution are zero and the mean and variance of logistic distribution is 0 and $\frac{\pi^2}{3}$

Contd..

11. Show that the M.G.F. of the χ^2 distribution is $(1-2t)^{n/2}$ with $|2t| < 1$. Find its cdf and derive the first four moments.

12. Show that the limiting form of t-distribution tends to standard normal distribution.

13. Derive the pdf and cdf of distribution of range in order statistics.

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